Kelly M. Taylor. THE EFFECTS OF SOCIAL STORIES™ ON LANGUAGE AND SOCIAL APPROPRIATENESS IN CHILDREN WITH AUTISM SPECTRUM DISORDERS. (Under the direction of Dr. John Heilmann) Department of Communication Sciences and Disorders, March, 2009.

This study employed a single-subject design to determine the effects of Social Stories™ treatment approach on the language and social skills, specifically turn-taking, of four children with autism spectrum disorders within the context of a summer language camp through East Carolina University. Four language measures and five behavioral measures were obtained through activities targeting behaviors included within the context of the Social Story. Three of the four participants displayed an increase in language measures while all four participants displayed an increase in at least one of the behavioral measures associated with turn taking. Language performance is thought to have been influenced by scaffolding and depended, in part, upon the language levels of the participants. Behavioral outcomes suggest that Social Stories can be feasible in increasing positive behaviors as well as decreasing negative behaviors.

THE EFFECTS OF SOCIAL STORIES™ ON LANGUAGE AND SOCIAL APPROPRIATENESS IN CHILDREN WITH AUTISM SPECTRUM DISORDERS

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CHAPTER 1: REVIEW OF LITERATURE

Introduction

Autism spectrum disorder (ASD) is a developmental disorder that affects communication and social interaction as well as how a person makes sense of the surrounding environment. Individuals are affected in different ways and to different degrees within the spectrum. Classic autism, pervasive developmental disorder-not otherwise specified (PDD-NOS), and Asperger's Syndrome are all included within autism spectrum disorders. One in 150 children are diagnosed with autism spectrum disorder, and while there is currently no known cause or cure, research provides investigation for effective interventions (Autism Society of America, 2008; Autism Society of North Carolina, 2008). The American Psychiatric Association (1994) states that children with autism spectrum disorders exhibit primary deficits in social interaction, language, and communication. Diagnostic criteria consist of impairments in nonverbal behaviors during social interaction, the inability to establish developmentally appropriate relationships with peers, and a lack of interpersonal communication. Communication deficits are displayed through echolalia, conversational initiation, and lack of imaginary play. Stereotypical behaviors in ASD are also considered in the diagnostic process in which an individual with ASD may become preoccupied with parts of objects or may exhibit an abnormal focused interest. Repetitive motor movements and the inability to deviate from routine are also considered during diagnosis (American Psychiatric

Association, 1994). Among deficits in social interaction and pragmatics, individuals with ASD have difficulty with turn taking during interactive play (Kroeger,Schultz, & Newsom, 2007). McDonald (1995) describes turn taking as an important tool for teaching children how to initiate interactions, produce creative responses, and maintain interactions.

Speech-language pathologists work to improve pragmatic skills and language comprehension and expression in their clients with ASD through role playing activities, social interaction and other such interventions according to the individual needs of the client (American Speech-Language-Hearing Association, 2007). Murdock, Cost, & Tieso (2007) described early elementary school students with ASD as only being engaged in social communication interactions half as much as their peers. Odom, Zercher, Marquart, Sandall, & Brown (2006) identified that children with autism are more likely to be socially rejected by their peers than those children who do not have deficits in social skill areas such as social problem solving and emotional regulation. With this rejection there may be limited opportunities for children with ASD to improve social skills (Conroy, Boyd, Asmus, & Madera, 2007). Thus it is critical to examine effective means for teaching appropriate social skills to children with ASD.

The Social Stories™ program was developed in 1991 by Carol Gray to provide a means for individuals with autism to obtain accurate social information in a manner that can be easily understood. It was noted that their responses to events and situations may

improve as a result of Social Stories (Gray, 2003). The guidelines for Social Stories have recently been updated to identify ten definitive characteristics to differentiate between this precise format and other visual strategies. These include sharing accurate social information with the child, adhering to appropriate style guidelines and including the prescribed sentence types that follow the Social Story formula for construction. Reynhout & Carter (2006) performed a comprehensive review of sixteen studies on the effects of Social Stories, and found that Social Stories are proficient in addressing a variety of behaviors (e.g., Bledsoe, Myles, & Simpson, 2003; Scattone, Wilcynski, Edwards & Rabian, 2002; Swaggert *et al*., 1995; Thiemann & Goldstein, 2001).

Target Behaviors for Social Stories

The majority of studies conducted, have involved Social Stories to decrease negative behaviors rather than improve appropriate social behaviors (Delano & Snell, 2006; Scattone, Tingstrom & Wilczynski, 2006). Scattone et al. (2002) examined the effectiveness of the Social Stories intervention program and decreasing negative social interactions. They found that there was an overall reduction of previously existing disruptive behaviors using Social Stories intervention. Social Stories have been found to reduce the occurrence of repetitive behaviors over a period of time as well as increase comprehension. (Reynhout & Carter, 2007). Reynhout & Carter (2006) implemented an ABC single-subject design that resulted in decreased repetitive taping behavior during reading over 70 days. During the second and third phases of the intervention, increases

in comprehension were noted via increased correct response rate. Implementation of the intervention in a group setting would further explore the use of Social Stories in a more naturalistic setting. Furthermore, while comprehension was measured, verbal output throughout the intervention was not assessed, leaving room for such measures to be considered in subsequent studies. These findings highlight the importance of taking into consideration the language and comprehension skills of participants when conducting such studies.

Scattone, Tingstrom, & Wilczynski (2006), examined the affect of using Social Stories on increasing appropriate social behaviors. Behavioral improvements were noted with decreased affect size when compared to earlier studies that examined decreasing disruptive behaviors. It is thought that this may be due to the complexity of social engagement with peers versus a more direct and simplistic task that involves ceasing a disruptive behavior (Scattone, et al., 2006). In other words, Social Stories may be more effective in decreasing inappropriate behaviors than increasing appropriate social behaviors.

Relationship Between Oral Language and Social Stories

Social Stories intervention requires the use of oral language skills for accurate interpretation and reproduction of the passages. In order for a story to be retold, it must be understood, held in the memory, and then verbalized in a meaningful way for the listener. These processes of comprehension and production are valuable to social

interactions and academic accomplishment (Diehl, Bennetto, & Young, 2006; Fox & Wright, 1997, & Houston, 1997). Comprehension and production of narratives require simultaneous integration of multiple linguistic skills. Children must be able to analyze perceptual information, access their mental lexicon, and have the ability to utilize discourse level processes; such as structural, prepositional, and world knowledge (Catts & Kamhi, 2005). Children with autism often have difficulty with multiple aspects of comprehension and production of narratives. Young, Diehl, Morris, Hyman, & Bennetto (2005), documented that children with ASD displayed a significantly lower ability to answer inferential questions from Strong Narrative Assessment Procedure (SNAP; Strong, 1998) than their typically developing peers. Norbury & Bishop (2002) state that children with high-functioning autism exhibit more difficulty answering literal questions than age-matched peers. Norbury and Bishop concluded that children with high functioning ASD were more likely to have deficits in inferencing than those children with Specific Language Impairment (SLI) or Pragmatic Language Impairment (PLI).

Nation, Clarke, Wright, & Williams (2006), indicate that from a group of 38 children with ASD who demonstrated measurable reading skills, characterized by mean standard scores for word reading, text reading, and non-word reading within the normal range on the Neale Analysis of Reading Ability-II (NARA-II; Neale, 1997), 65 percent of them exhibited reading comprehension that was at least one standard deviation below the norms when asked literal and inferential questions post reading. Thirty-eight percent of

the participants performed at a level of at least two standard deviations below the population norms. These findings suggest that children with ASD have significant deficits in comprehension when introduced to a passage for the first time.

Paul (2007) states that phonology, syntax, and morphology tend to be at a relatively age-appropriate level for verbal children with ASD; however, Norbury & Bishop (2003) found that errors in syntax, including sentence complexity and tense, distinguished children with high functioning autism from typically developing children. Norbury & Bishop (2003) state that these children produced more ambiguous nouns and pronouns than their typically developing peers or children with other communication impairments including Specific Language Impairment (SLI) and Pragmatic Language Impairment (PLI). While most phonological, syntactic, and morphologic skills tend to remain relatively intact, research indicates that individuals on the autism spectrum have difficulty with integration of information when in context (Nation & Norbury, 2005).

Difficulties exhibited with production and comprehension of narratives in children with ASD are similar to children with language impairments and other developmental disabilities (Capps, Losh, & Thurber, 2000; Tager-Flusberg & Sullivan, 1995). Norbury & Bishop (2003) state the narrative skills of children with Specific Language Impairment, Pragmatic Language Impairment, and high functioning autism were examined and compared to each other and to a group of typically developing children. It was found that all three groups with impairments produced as many words as

typically developing children, but their statements were said in a simpler manner. Syntactic measures were found to be similar between the examined groups, but proved to be effective in distinguishing the impaired groups with typical peers. The only noted difference in narrative ability that separated the examined group was that participants with autism were found to produce ambiguous nouns and pronouns.

Norbury & Bishop (2003), state there have been few studies that examine the narrative skills of children with ASD. Of these studies children with ASD have particular difficulty with story organization and depiction of the main idea (Baron-Cohen, Leslie, & Frith, 1986; Losh & Capps, 2003; Loveland & Tunali, 1993). Losh & Capps (2003) examined storybook narratives and personal narratives for grammatical, evaluative, and structural aspects. They describe the production of personal narratives to be far more difficult for children with ASD than storybook narratives. Production of complex syntax was drastically decreased in the personal narrative trials. Within storybook narratives children with ASD included fewer story components, but were able to produce the main idea with the same accuracy as their typically developing peers. Children with ASD differed from their typically developing peers in the production of personal narratives only. Participants with ASD told as many personal narratives about family, friends, and pets as their typically developing peers, but included more about computers than sports, which tended to be present in the typically developing peer stories. The participants with ASD used evaluation, including causality, emotion and cognition, negatives, hedges,

character speech, attention-getters, and subjective remarks, much less in their personal narratives than in the comparison group. However, both groups demonstrated relatively equal amounts during storybook narratives. The control group used approximately the same amount of evaluation during both narratives, while the group with ASD used significantly more during storybook narratives.

Scaffolding Narratives in Children with Autism

Because children with ASD have difficulty with narratives, clinicians and researchers should identify methods of supporting their production. Scaffolding asserts that the more support that is given, the better the performance on a task. When cued to retell a story, children use more complex language compared to situations where they spontaneously generate a story (Schneider & Dube, 2005). Thus, repeated retellings are thought to provide scaffolding for children with autism, who have substantial difficulty with narrative form (Levy & Fowler, 2005). Levy and Fowler (2005) documented improved narrative performance using this type of scaffolding for an adolescent with high functioning autism. This study found that, like nonautistic children, he created coherence in his narrative over time by creating an initial structure and expanding it through repetition, prompting, and modifications to linguistic forms. If the story is above the child's language level, however, any amount of scaffolding will not be useful. When the story is at or below the child's language level, on the other hand, fully competent performance would be expected in early treatment sessions, with modest gains

throughout the course of treatment. Better performance on receptive and expressive language tasks would be expected when Social Stories are written at appropriate language levels and this increased performance would be expected to be related to better performance on the social tasks.

Summary and Rationale

While interest in Social Stories continues to grow, few studies have been conducted to examine the outcomes of the increase in appropriate social skills and language outcomes (Reynhout & Carter, 2006). Many of the previous studies have focused on reducing inappropriate behaviors, with only a few aimed at increasing appropriate social responses (Scattone et al., 2006). While many of the studies demonstrate Social Stories to be effective in behavior modification, no current studies have measured the effects of Social Stories on both oral language ability and social skills while looking at increasing versus decreasing appropriate social behaviors within a single goal. Given the impaired language skills in children with ASD, it is likely that the effectiveness of Social Stories will be influenced. Furthermore, repeated use of Social Stories and the scaffolding it provides may supply further support for oral language skills. Therefore, it is necessary to examine both pragmatic and language outcomes in Social Stories intervention. This study aims to address the following research questions:

1. Do Social Stories result in a substantial increase in task-specific receptive and expressive language measures in children diagnosed with ASD?

2. Do Social Stories result in a substantial increase in task-specific positive social behavior measures in children with ASD?

3. Do Social Stories result in substantial decrease in task-specific negative social behavior measures in children with ASD?

4. Is there a relationship between task-specific social outcome measures and task-specific language outcome measures in children with ASD?

CHAPTER 2: METHODS

Participants

The study consisted of four boys between the ages of 6 and 8 years who had previously been diagnosed with autism spectrum disorder (ASD) characterized by primary deficits in social interaction, language, and communication (American Psychiatric Association, 1994). These participants were selected from an East Carolina University summer language camp. The structure of this camp allowed for Social Stories to be easily implemented and language and social skills measured in a group setting. Four other children attended the camp, but were not enrolled in the study. Each of the four selected participants had testing within the past two years, which indicated that he presented with moderate language delays with primary deficits in expressive language. All four participants also exhibited significant pragmatic deficits secondary to their diagnosis of autism, including lack of eye contact, difficulty with parallel play, joint attention, and reciprocal interaction, as well as difficulty following conversational mores. This was documented in clinical records and ascertained by clinician judgment at commencement of the study. Participants 1, 2, and 3 consistently produced at least 4-5 word utterances in spontaneous conversations as documented in clinical records and by clinician judgment at the start of the study. Participant 4 demonstrated modest expressive language skills spontaneously, but was able to produce 4 – 5 word utterances with prompting. The other four children who participated in the camp but were not enrolled in

the study had limited functional expressive language skills or had not been diagnosed with ASD. In addition to the summer camp, all participants were receiving individual speech-language therapy at the time of the study.

Background Information

Language testing for each participant was completed prior to the initiation of treatment to document baseline receptive and expressive language skills. The Test of Auditory Comprehension of Language, 3rd edition *(TACL-3*; Carrow-Woolfolk, 1999) was administered to document baseline receptive language skills in each of the following areas: vocabulary, grammar and syntax. The participants' ages and standard scores on the TACL-3 are summarized in table 1. According to the TACL-3 manual, participants 1, 2, and 4 had receptive language skills in the "very poor" range and participant 3 had receptive language skills in the "low average" range. As indicated by the individual subtest scores, each participant demonstrated relative strengths and weaknesses across the various tasks. Participant 1 performed slightly better on the receptive grammar task than the other two tasks while participant 2 demonstrated a weakness in receptive syntax when compared to vocabulary and grammar. Participant 3 scored within the average range on all three subtests; however, he demonstrated relative strengths in receptive grammar and syntax with a weaker performance in vocabulary skills. Participant 4, on the other hand, demonstrated a relative strength in receptive vocabulary with substantial relative weaknesses in grammar and syntax.

Table 1

Participants' TACL-3 Quotient and Subtest Scores

Participant	Age	TACL-3 Quotient	Vocabulary Subtest (Avg. 7-13)	Grammatical Morphemes Subtest (Avg. 7-13)	Elaborated Phrases and Sentences Subtest (Avg. 7-13)
1	8-0	68*	5	6	4
2	8-1	59**	4	5	2
3	6-2	91	7	9	10
4	6-6	53**	5	1	2

* At least 1 standard deviation below the mean

** At least 2 standard deviations below the mean

Each participant completed a narrative retell task to obtain a baseline measure of expressive language skills. The participants were each told a story while following along with the pictures in a wordless picture book. At the completion of the story, the participant was asked to retell the story with the pictures provided to assist with recall ability. The participants in the first grade completed the retell task using *Frog Where Are You?* (Mayer, 1969) and the second grade participants used *Pookins Gets Her Way* (Lester, 1987), which had the words covered to make it a wordless book. These stories were chosen because a database of typical speakers completing the same protocols were available with the Systematic Analysis of Language Transcripts software (SALT; Miller & Iglesias, 2007). The samples were analyzed and three measures were calculated for each of the samples using SALT. *Number of Total Utterances (NTU)* was completed to measure story length and verbal productivity, *Mean Length of Utterance in Morphemes (MLU)* was used to document the participants' expressive grammar skills, and *Number of Different Word Roots (NDW)* was used to document the participants' lexical diversity. The participants' measures were compared to that of grade-matched peers obtained from the SALT database. The participants' scores for each measure and performance relative to the database are summarized in Table 2.

Table 2

Participants' baseline narrative retell performance on normed data

Participant	Age	Number of Total Utterances	Mean Length of Utterances in Morphemes	Number of Different Word Roots
1	8-0	25*	5.32**	63**
2	8-1	23*	3.09**	28**
3	6-2	41	7.07	91
4	6-6	9**	2.33**	12**

* At least 1 standard deviation below the mean

** At least 2 standard deviations below the mean

Both Participant 1 and Participant 2's *Total Utterances* were greater than one standard deviation below the database mean while their *MLU in Morphemes* and *Number of Different Word Roots* were more than 2 standard deviations below the database mean. Their story retells included repetitive utterances and lacked meaning and variation indicating moderately-severe expressive language delays characterized by deficits in syntax and grammar. Participant 3's language sample measures were not significantly different from children in the database. Although language delays were indicated in previous clinical records, the records and clinician observation indicated primary deficits in the use of language, or pragmatics. Participant 4's performance on all three measures was found to be at least 2 standard deviations below the database mean indicating severe expressive language delays characterized by primary deficits in syntax and grammar.

A hearing screening was conducted to rule out hearing loss as a possible affect on performance. Participants 1, 2 and 3 all passed the hearing screening in both ears at 1000, 2000, and 4000Hz at 20 db. Participant 4 would not comply with the screening in three different attempts made on separate days by the primary investigator and 2 other certified speech-language pathologists; however, he did not display typical behaviors frequently exhibited by children with hearing loss (Berry, 1988).

Treatment Setting

All participants attended a language-based summer camp provided by the East Carolina University Speech-Language and Hearing Clinic. The camp was held at a local

church preschool led by two certified speech-language pathologists and four graduate student clinicians. A typical day at camp consisted of guided free play, opening circle, small group language activities, snack time, playground time, fine and gross motor activities, closing circle, and dismissal. The focus of camp was on increasing pragmatic skills and receptive language as well as increasing overall expressive language for functional communication. Some of the specific pragmatic goals included interactive play, sharing, politeness markers, and remaining seated during circle time. Receptive goals included following one and two step verbal commands. In addition to the classroom goals, individual goals were created for each of the campers that targeted each child's specific needs and deficits. Each graduate student clinician was considered the primary clinician for two of the campers and assisted those campers in meeting both classroom and individual goals. Multiple opportunities were given throughout the day to target each goal.

Social Story Treatment

Social Stories

Two Social Stories were developed to address the concept of turn-taking (see Appendix A). This concept was addressed through two specific activities, a slide activity and a parachute activity, that were referenced in the stories and incorporated into regularly scheduled activity times. All children attending camp participated in these activities, although only the four specified participants were included in data collection.

While other planned camp activities addressed a variety of pragmatic skills, the activities included in this study were independent from other camp goals, and turn-taking was not formally addressed in any other activities. Each story adhered to Gray's (2004) Social Story guidelines for construction. Suggestions were made within the context of the story for appropriate participant responses to the specified social activities involving turn-taking (e.g., "I can go under when the teacher says my name", "I will try to wait for the other child to take his turn"). Both stories included a description of what would take place during the activity, an indication of how the participant would know it was his turn, the suggestion that it was a good idea to wait while other children took their turns, and a positive emotional outcome for proper turn-taking. In compliance with Gray's recommendation, illustrations were incorporated into each story in an effort to capture interest and enhance comprehension. Each story was visually presented to the participants on a lap top computer in a PowerPoint™ format, as computers are often very attractive and highly motivating to children (Gray 2004; Howley & Arnold, 2005). The participants followed along with the illustrations while listening to the clinician read the story. Upon completion of the Social Story, the clinician inquired about the concrete and inferential aspects of the story.

Design

This study employed a single-subject experimental design. The social story treatment was completed in a quiet room separate from the rest of the camp and provided

on a 1:1 clinician/client ratio. The social outcomes associated with the Social Stories were measured during structured group play. Baseline data were collected over the first three sessions of camp, prior to the initiation of the Social Stories treatment program. The participants were shown the illustrations that were contained within the Social Story and asked to retell the story to the examiner. The participants' oral stories were audio recorded and later analyzed. During turn-taking activities throughout the day, the indicated social measures were video recorded during one of three activities: parachute play, slide on the playground, or during a coloring activity. During parachute play, as indicated in the Social Story, a clinician gave the command “parachute up”. The name of a participant was called to run under the parachute. He was then expected to come out and return to holding the parachute handle. Each participant was given 2 to 6 opportunities to take a turn and each turn lasted 10 seconds. During the slide activity, the participants were expected to line up behind the slide and wait for their turn to be cued with “Ready, Set, Go.” Turns were limited to the time spent on the playground, which was between 9 and 14 minutes. The prompts and expected activities for the slide and parachute activities were explicitly related in each of the Social Stories. The third activity was designed to measure generalization effects of the specified behavioral measures relative to turn-taking, thus no intervention was provided. This activity involved the participants waiting in line for a turn to color a cardboard castle. Each participant was allowed 2 to 4 turns with 10 seconds for each turn.

Outcome Measures

Four language measures related to the comprehension and retelling of the social stories and five social measures, related to the concept of turn taking as described in the stories were collected throughout the treatment program and analyzed at the conclusion of the four week study.

Language measures. After listening to the Social Story, each participant was cued to retell the story. The verbal productions were recorded and later transcribed by the principal investigator using SALT (Miller & Iglesias, 2007). The language samples were examined at two levels: macrolinguistic analysis that documented the participants' ability to comprehend and incorporate text-level concepts into their retells, and microlinguistic analysis, including vocabulary and grammar skills. The first macrolinguistic analysis completed was the *story information score*, which examined the participants' ability to include the key story elements in their retell. This method was modeled on story grammar analyses, which document children's ability to organize their narrative productions (see Hughes, McGillivray, and Schmidek, 1997 for a review). The principal investigator created a scoring rubric for the *story information score* by identifying each key story component. Each story was analyzed to determine if participants included the setting (characters and location), initiation of activity, description #1, directive #1 (two components), description #2 (two components), directive #2, directive #3, affirmative statement, and outcome (see Appendix B for a

summary of the scoring schemes for each of the stories). The dependent variable was the number of narrative components correctly recalled out of these 12 possible components. Upon evaluating the transcribed language samples, the examiner coded the number of story structure components included in the story (range = 0 – 12).

The second macrolinguistic measure assessed participants' comprehension of the story. The *comprehension* measure examined participants' understanding of key story components and ability to infer higher level narrative concepts. These skills were measured according to the participant's response to three literal and three inferential comprehension questions that examined the understanding of what the activity would entail, the expected behavior related to turn taking, and emotional outcomes for behavior related to turn-taking (see Appendix A). It was predicted that each participant would answer a higher percentage of the literal questions correctly when compared to the inferential questions. A question was read in a random order and the response was recorded. If a participant did not answer the question, the clinician provided three pictures (1 correct answer and 2 foils). The pictures were displayed and the participant was asked to verbally choose or point to the correct response. Responses were scored numerically with a 0 indicating an incorrect or absent response, a 1 indicating a correct response with the use of a visual aid, and a 2 indicating a correct response with no visual aid. Initial analyses of the data revealed that the participants did slightly better on the

literal questions, but that both question forms were sensitive measures (i.e., void of floor and ceiling effects). Therefore, both direct and inferential questions were combined and analyzed using a single comprehension score. The dependent variable was calculated by dividing the total number of points scored correctly divided by the total number of possible points (i.e., 12).

In addition to the narrative structure and comprehension measures, the language samples were analyzed using two microlinguistic measures that documented the participants' lexical and grammatical skills. The entire language transcript was utilized due to the brevity of each individual narrative. Analysis included both intelligible and unintelligible segments for all participants due to the low expressive language levels of the participants 1, 2, and 4. *Mean length of utterance in morphemes (MLU)* is a measure of the average number of morphemes per c-unit, which is a robust index of children's overall language skills and is highly correlated with children's grammatical ability (Brown, 1973; Miller, 1981). *Number of different words (NDW)* includes the total number of different words contained in the language sample, which is an index of the children's lexical diversity and closely relates to children's overall vocabulary skills (Klee, 1992).

Behavioral measures. Outcomes of social measures were utilized to examine proper turn-taking skills, interruptions to another child's turn, as well as participation in

two separate camp activities and a generalization activity. These behaviors, as previously highlighted, were addressed within the context of the social stories. For the purposes of the current study, a *turn* was defined as one physical action completed by the participant in compliance within a given activity. The number of turns a client tolerated was measured by the percentage of turns a participant willingly took during a given number of opportunities. Two types of turns were coded. *Prompted turns* consisted of a turn taken after the participant was given a verbal prompt to initiate the turn, whereas *spontaneous turns* occurred when the participant initiated and completed the turn independently with no verbal encouragement. *Interruptions to another child's turn* consisted of the number of times the participant interrupted another child's turn by attempting to take a turn before the other child had completed his turn. A percentage was calculated based on the number of interruptions out of the number of turns taken by peers.

Measures examined for the parachute activity included *prompted turns,* which was the percentage that the participant went under the parachute when his name was called and *interruptions to another child's turn,* as previously described. *Spontaneous turns* were not measured for this activity, as initiating and completing a turn independently with no verbal encouragement would be considered an *interruption* for this specific activity. In addition to the two turn-taking measures, two additional measures were coded to indirectly document how well the participants stayed engaged in the activity. The effect of the Social Story on voluntary participation in the activity was

examined through the *dropped handle* measure, which accounted for each time the participant released the handle of the parachute. This action signified a lack of participation in the activity. Two points were assigned each time a participant released the handle and walked away from the activity, 1 point was assigned when the participant let go of the handle but remained within an arm's length of the parachute, and a 0 was assigned when the participant maintained contact with the handle throughout the entire activity with the exception of a *turn*, in which the participant was required to drop the handle. In addition to the *dropped handle measure*, a second behavioral measure was analyzed during the parachute activity. After each turn, the participant was expected to return to the circle and recommence holding the handle to the parachute as indicated in the Social Story (ie. "I will try to come out and hold the handle"). The *returned to handle* measure further documented participants' ability to maintain engagement and turn-taking in the activity. Two points were assigned when a participant returned to the handle after his turn with no prompt, 1 point was assigned when the participant returned to the handle after a prompt was given, and 0 was assigned if the participant did not return to the handle after given a prompt or if he walked away from the activity. The *returned to handle* measure was then calculated by adding the number of points assigned and dividing by the total number of opportunities for a turn.

The slide activity measures included all three of the *turn* measures: *spontaneous turn, prompted turn,* and *interruptions to another child's turn.* A *spontaneous turn*

consisted of the participant independently lining up and sliding down the slide. The following points were assigned for numerical interpretation of the measure: 0.5: a turn was spontaneously taken but participant did not wait for "Ready, set, go" cue before sliding; 1: participant lined up and waited for at least 4 seconds, but walked off before turn was taken; 2: participant lined up and waited for at least 4 seconds, but walked off before turn was taken. A *prompted turn* was comprised of the number of times that the participant lined up behind the slide and slid down when his name was called, out of the number of given opportunities. No additional behavioral measures were collected for the slide activity.

The coloring activity was implemented to determine any generalization effects from the intervention. Activity measures included *prompted turn, interruption to another child's turn, left line,* and *returned to line*. The latter two measures were comparable in the nature of the task to the *dropped handle* and *returned to handle* measures, respectively. Points and percentages were assigned in the same manner that they were for the previous two activities. *Prompted turns* comprised of the percentage that the participant lined up behind the castle and proceeded to color it when his name was called. *Interruptions* to *a turn* consisted of the number of times the participant interrupted another child's turn by attempting to take a turn before the other child had completed his turn. As in the previous measures, a percentage was calculated based on the number of interruptions out of the number of turns taken by peers. The *left line measure* was

calculated by adding the total number of times the participant walked away from the line during the activity and dividing by the total number of sessions that included this activity. The *returned to line* measure consisted of the number of times a participant returned to the line after his turn out of the number of given opportunities. These numbers were rounded to the nearest tenth of a point for ease of interpretation.

Social Story Treatment Program

Data were obtained during the activities in which the participants participated three times per week for 4 weeks (12 sessions). Before the implementation of each Social Story, baseline expressive language data were collected over two sessions. Each participant was given illustrations that were contained within the Social Story and asked to spontaneously produce a narrative based on previously mentioned criteria, with the exception of the comprehension questions. After completing two baseline sessions, the participants completed 10 treatment sessions. In each treatment session, each participant completed the social story activity 1:1 with the principal investigator and then completed the associated social activity later in the day. Data regarding social appropriateness was collected over baseline and treatment during the three social activities. All data were recorded and later analyzed. The language samples were recorded using a digital audio recorder and the social activities were recorded with a digital video recorder. In addition to the 1:1 Social Story task, each story was read aloud to the entire group by the primary investigator prior to the turn-taking activity.

CHAPTER 3: RESULTS

Language Measures

It was hypothesized that the two macrolinguistic measures: *narrative retell story structure* and comprehension skills, and two microlinguistic measures: *mean length of utterance in morphemes* and *number of different words*, would increase as the intervention proceeded. The analyses were categorized into three time frames: baseline, first five treatment sessions (1st period), and last five treatment sessions (2nd period)to increase ease of interpretation across multiple measures and participants and to observe trends across the two intervention periods. The Baseline section included a total of two baseline sessions with one for each activity. Table 2 shows the participants' average performance on the macrolinguistic measures from baseline to the first and second halves of intervention. Table 3 displays the participants' average performance on the microlinguistic measures from baseline to the first and second halves of intervention. It should be noted that participant 1 missed two sessions due to illness, participant 2 was not present for the final three sessions due to an unexpected circumstance, and participant 3 missed one session due to a family matter. These absences were considered and accounted for in the averages by dividing obtained measures by the number of actual sessions each participant attended.

Table 3

Participants' average scores on macrolinguistic measures

	Story Structure			Comprehension	
Participant	**Baseline**	**1st Period**	**2nd Period**	**1st Period**	**2nd Period**
1	1.5	5.0	5.8	3.8	6.0
2	1.5	3.8	5.5	4.0	4.5
3	2.0	11.0	12.0	8.6	10.5
4	1.0	1.25	0.8	1.0	1.0

Table 4

Participants' average scores on microlinguistic measures

	Mean Length of Utterance			Number of Different Words		
Participant	**Baseline**	**1st Period**	**2nd Period**	**Baseline**	**1st Period**	**2nd Period**
1	4.8	6.4	6.5	31	39	42
2	1.6	4.6	4.9	12	23	27
3	7.3	8.2	8.1	41	45	46
4	1.5	1.1	1.4	9	5	7

All participants, with the exception of Participant 4, demonstrated modest to substantial increases in their task-specific receptive and expressive language performances over time for all language measures. As indicated by the data listed in tables 3 and 4, participant 1 showed the most consistent growth across all of the language and comprehension measures. He increased from recalling 1.5 story components at baseline to recalling 5.0 and 5.8 across 1st and 2nd periods for the *Story Information Score.* He answered nearly twice as many comprehension questions correctly, increasing from 3.8 to 6.0 and demonstrated consistent growth in both microlinguistic measures. *Mean Length of Utterance* increased from 4.8 at baseline to 6.4 and 6.5 across the two treatment periods and the *Number of Different Words* produced increased from 31 at baseline to 39 and 42 across the treatment periods. Participant 2 showed consistent growth across *story information* and *comprehension* measures with baseline for *Story Information* beginning at 1.5 and increasing to recalling 3.8 and 5.5 components across treatment periods and correct answers to comprehension questions increasing from 4.0 to 4.5. There was rapid growth from baseline to the first period of MLUm and NDW with a steady increase thereafter. The following data were obtained: 1.6 at baseline to 4.6 and 4.9 across treatment periods for MLUm with 12 different words produced at baseline increasing to 23 and 27 across treatment periods. Participant 3 displayed a rapid growth from baseline to intervention followed by a plateau for all language measures. He recalled 2 components at baseline for the *Story Information Score,* increasing to 11 and

12 across treatment periods. *Mean Length of Utterance* increased from 7.3 to 8.2 and 8.1 across baseline and intervention, respectively while *Number of Different* Words resulted in increases from 41 to 45 and 46. There was a substantial increase in the comprehension measure from the first to second periods of intervention for participant 3 with baseline at 8.6, increasing to 10.5. Participant 4 remained consistent on all of the oral language measures throughout baseline and intervention measures, with a slight decrease in number of different words from baseline to intervention. He recalled 1 Story Information component at baseline with 1.25 and 0,8 across intervention. Comprehension remained at 1.0 across baseline and intervention and *Mean Length of Utterance* was 1.5 at baseline with a slight decrease to 1.1 across the 1st treatment period and a slight increase to 1.4 over the 2nd period, yet, still a slight decrease from baseline. *Number of Different Words* decreased from 9 words to 5 and 7 words over the treatment periods.

Behavioral Measures

Treatment Activities. Behavioral data were collected over one baseline and five intervention sessions for each activity and later coded and analyzed for each of the four participants. It was expected that *interruptions to a turn* and the *dropped handle* measure would decrease from baseline and intervention periods while all other measures were expected to increase. Again, performance on each of the measures (ie. negative behaviors, positive behaviors), as measured by the previously stated criteria, was collapsed across three phases of the treatment program (baseline, first period, and second

period) and is summarized in tables 4, 5, and 6. Variability in performance was noted across the four participants and from baseline and through the 1st and 2nd periods of treatment. Criteria for improvement (ie. decrease in negative behaviors, increase in positive behaviors) could be established as a gradual decrease across all negative measures with a gradual increase across all positive measures or if measures during the treatment phases were consistently better than baseline. The criterion for improvement in this study adhered to the latter as to account for performance that was variable between the 1st and 2nd periods of treatment, but was still an improvement from baseline.

Table 5

Negative Behaviors

	Dropped Handle			Interruptions to another child's turn		
Participant	**Baseline**	**1st Period**	**2nd Period**	**Baseline**	**1st Period**	**2nd Period**
1	0	1.5	0	.5	.25	.25
2	0	0	N/A	0	1.6	1
3	1	0	.5	0	.4	.75
4	11	5.67	4	1	.6	0

Table 6

Positive Behaviors

	Prompted Turn			Returned to Handle after Turn		
Participant	**Baseline**	**1st Period**	**2nd Period**	**Baseline**	**1st Period**	**2nd Period**
1	100%	63%	88%	.5	.92	1.75
2	50%	80%	100%	1.5	1.11	N/A
3	100%	75%	81%	1.33	1.78	1
4	34%	65%	40%	1	.75	1

Table 7

Percentage of Waiting for Turns Displayed During Slide Activity

	Waiting for Turns		
Participant	**Baseline**	**1st Period**	**2nd Period**
1	0%	75%	75%
2	0%	100%	100%
3	0%	100%	100%
4	0%	20%	100%

As presented in Tables 4 and 5, participant 1 exhibited an increase in the number of times he returned to the parachute handle after his turn and displayed a decrease in the number of interruptions to another child's turn. Performance on the other two measures, dropped handle and prompted turns, was satisfactory at baseline and slightly faltered or remained unchanged during the intervention. Participant 2 showed a steady increase in prompted turns with an increase in interruptions to another child's turn from baseline, and insufficient data to be conclusive for the parachute activity. Participant 3 demonstrated variable performance on these measures. He exhibited a decrease in the number of times he dropped the parachute handle but demonstrated a slight increase in the number of times he interrupted another child's turn. He showed a decrease in prompted turns from 100% at baseline and demonstrated an increase in the number of times he returned to the parachute handle over the first period of treatment with a decrease from baseline over the second period of treatment. While participant 4 showed the most noticeable gains in turn-taking with an increase in prompted turns from baseline, a decrease in interruptions and a substantial decrease in the number of times the parachute handle was dropped.

The percentage of time spent waiting in line during the slide activity was another measure of positive behavior outcomes and was measured for both prompted and spontaneous turns and then averaged at baseline and across both intervention periods (see table 6). All participants showed substantial increases in their performance when waiting for a turn during the slide activity.

Generalization Activity

The coloring activity was implemented to determine any generalization effects resulting from intervention. Measures (i.e., *prompted turn, interruptions to another child's turn, left line,* and *returned to line*) were comprised of the same negative and positive turn-taking behaviors assessed during the intervention activities and were collected at baseline and from 3 sessions during the intervention period. Participants 1, 2, and 3 were each absent during one of the days that the generalization activity was measured which has been accounted for. Results are listed in Table 7.

Table 8

Averaged Negative and Positive Behavioral Measures for Generalization Activity

	Left Line		Interruptions to another child's turn	
Participant	Baseline	Treatment period	Baseline	Treatment period
1	2	1	0	0
2	0	.5	1	0.5
3	1	3.5	0	0
4	4	.67	1	0

	Prompted turns		Returned to line	
Participant	Baseline	Treatment period	Baseline	Treatment period
1	100%	100%	.5	.75
2	100%	100%	1	1
3	100%	100%	1	1
4	100%	100%	1	1

For the generalization coloring activity, where no intervention was given, little change was noted in the most of the participants' performance across time. There was no change in participant 1's performance on prompted turns and interruptions, with a slight increase in returning to the line and a decrease in leaving the line. Participant 2 interrupted slightly less, but left the line slightly more, and had no increase or decrease in returning to the line or prompted turns. The only change that was observed in participant 3 was that he increased the amount of times he left the line. Participant 4 showed the greatest change with a decrease in interruptions to another child's turn as well as a substantial decrease in the average number of times he left the line. No change was present in the other two measures. While there were fewer changes in the generalization activities, the changes that were observed occurred with both the positive and negative behaviors.

Discussion

Summary

Research has indicated that Social Stories are effective in behavior modification (e.g., Bledsoe *et al*., 2003; Scattone *et.al*., 2002; Swaggert *et al*., 1995; Thiemann & Goldstein, 2001); however, no studies to date have investigated the effects of Social Stories on both oral language ability and social skills while examining increasing versus decreasing social behaviors within a single goal. The present study examined the effects of Social Stories intervention on the social skill of turn-taking and the language of four

children diagnosed with autism spectrum disorders within the context of a summer language camp. Both macrolinguistic and microlinguistic language measures were examined through narrative retell, and the outcomes of both positive and negative social skill behaviors associated with turn-taking were evaluated through two activities described in each story.

Language Outcomes

The first research question addressed whether Social Stories resulted in a substantial increase in receptive and expressive language skills in the participants. Increases were observed across all macrolinguistic and microlinguistic measures for all participants with the exception of participant 4, who remained approximately at baseline or displayed slight decreases. It is felt that scaffolding, in part, contributed to the noted increases in language across the first three participants as it asserts that the more support that is given, the better the performance on a task. In the present study, scaffolding was implemented by the number of times the same social story was presented. Each time it was presented, knowledge of the story was increased. Participants had exposure to each social story twice per intervention day over the course of multiple intervention sessions. Westby (2005) suggested that exposure to repeated scaffolding enhances the understanding of narratives. In this study, scaffolding occurred as the result of functional treatment activities providing a personal account to which the participants were able to relate the stories that they read. In addition, the comprehension questions presented at the

completion of each narrative provided further reinforcement of the components contained within each story. The improvements in narrative skill in this study was likely due to the scaffolding provided in the Social Stories treatment, a result similar to that found by Levy and Fowler (2005).

Effective scaffolding requires that the presented narratives be in accordance with the current level of language functioning in order to enhance performance (Paul, 2007). That is, a presented narrative should not exceed the child's receptive language ability (ie. comprehension, lexicon) and should mirror the child's expressive language ability, including only syntax and grammar that the child effectively and consistently utilizes. Participant 4 exhibited the lowest language of the four participants as evidenced by his score on the Test of Auditory Comprehension of Language and exhibited the lowest expressive language as evidenced by his performance on the baseline narrative retell task as well as through clinician observation. Therefore, the social stories designed for the group may have not been appropriate for his individual language level. Furthermore, he often seemed disinterested and preoccupied during the administration of the Social Story reading. While his attention was continuously redirected to the story, the examiner often wondered if his concentration was fully on the story. This was observed during group story time as well, where he appeared inattentive and highly distractible. Furthermore, Participant 4 displayed negative or, in some cases, aggressive behaviors during story time which also may have contributed to his performance on these measures. These behaviors

were observed at various times throughout the camp day when he became frustrated or disinterested and thus are not thought to be an isolated product of the intervention.

Behavioral Outcomes

Upon examination of the positive social skill behavioral outcomes, it was determined that all four participants improved in at least one of the measures. Three of the four participants improved in at least one of the measures that evaluated decreases in negative social skills. With regard to individual performance, participant 1 displayed no trend for positive versus negative behaviors. He showed improvements in 2 out of 3 positive behavior and 1out of 2 with regard to negative behaviors. Participant 2 showed a slight benefit for positive behaviors over negative behaviors with increases in 2 out of 3 positive behaviors and decreases in 0 out of 2 negative behaviors. Participants 3 and 4 demonstrated slight benefits for negative behaviors over positive behaviors with participant 3 showing an increase in 1 out of 3 positive and 1 out of 2 negative behaviors and participant 4 showing an increase in 2 out of 3 and 2 out of 2 positive and negative behaviors, respectively. In sum, there were increases in positive behaviors and decreases in negative behaviors, with variation among individual performance. Some participants demonstrated greater increase in positive behaviors while some demonstrated a greater decrease in negative behaviors. This indicates that Social Stories is a feasible treatment approach for addressing both positive and negative behaviors. Previous studies primarily focused on repetitive/stereotypical behaviors, which the examiners were trying to

decrease. The present study focused on more general, abstract behavior that occurred within the context of a naturalistic group setting. The results are promising that Social Stories can be applied to these types of behaviors. Minimal changes in performance during the generalization period suggest that social stories may be specific to the activities that they address and should be developed accordingly.

Relationship between Language and Behavioral Outcomes

Upon examination of the relationship between social skill outcomes and language skills in children with ASD, results revealed that all participants' behavioral measures improved and 3 out of the 4 participants' language skills improved. Therefore, Social Stories appeared to facilitate both oral communication and behavioral skills in these participants. The importance, however, of adapting the stories to the child's language level cannot be underestimated as demonstrated by the language measure outcomes of participant 4. While this may have contributed to his lack of progress for language skills, as previously mentioned, his social skills did improve over the course of the study. It is important to note that participant 4 is home schooled and had very little prior exposure to interacting with other children in a structured group setting. His improvement in social skills, in addition to Social Stories, warrants cause for the investigation of the benefits of structured, group interaction on social skills for children with ASD.

Caveats in Interpretation of Treatment Outcomes

The present study and intervention was part of a more general treatment program and while the participants were not receiving direct instruction for these specific activities or for turn-taking, they were working on other social skills during the program. In addition, 3/4 participants were receiving 1:1 language intervention outside of the camp in which they were working on social skills. An additional caveat is the lack of a control group. While baseline data was collected, there is not stringent control for general growth or development.

Feasibility

In addition to the results for language and behavioral outcome measures, the feasibility of addressing language and social skill goals using Social Stories can be addressed. Fey and Gillam (2008) stated that even if a study does not have an ample amount of control and outcomes cannot be exclusively stated, theory of intervention and feasibility of completion of the study can still be discussed. With regard to feasibility in the present study, Social Stories appeared to be an effective means of increasing language skills and modifying behaviors. Social Stories were engaging for participants. The participants completed retells and answered questions through the entire treatment program and seemed to enjoy the use of the lap top computer.

Implementation of the intervention was relatively easy within the context of the camp. Each participant received the Social Stories intervention on a 1:1 basis and

required him to be away from the rest of the group for only approximately 10-15 minutes. The time that each participant was required to miss was minimal and occurred during free play or during clean-up time in between activities so that none of the participants missed out on any of the primary scheduled camp activities. The stories were later read to the entire group at the completion of snack time and served as a good transition into the next activity. The social story activities were easily incorporated into playground time and all children at the camp participated. Each activity lasted approximately 10-15 minutes with additional time remaining for free play. Overall, the intervention consumed about 14% of the total camp day; however, this time was incorporated into regularly scheduled activities to ensure that each participant benefited fully from the camp.

The linguistic measures from the social stories were sensitive to change and there were overall increases. While these increases were not necessarily due to an increase in general language abilities, the increases demonstrate that the participants were engaged in the activity, learning the structure of the social stories, and increasing their linguistic output in the task. Participants 1-3 demonstrate that these stories are appropriate for their language level. Participant 4 displayed low initial and continued language skills indicated that the stories were probably too advanced for his level of language. This approach was therefore deemed inappropriate for this participant due to language levels; however, clinicians implementing this approach would be advised to adjust goals and activities accordingly.

Behavioral outcomes were difficult to measure as there were multiple measures contained within each activity and recording the behaviors for later coding proved to be a challenge. Despite the challenge in measuring and examining behavioral measures, the intervention was easily implemented, enjoyable for the participants, and fit well into the framework of a language-based summer group camp.

In conclusion, this study evaluated the effects of social stories on the language and social skills of four children with autism spectrum disorder. Overall, increases were observed in language in 3 of the 4 participants as well as increases in positive behaviors and decreases in negative behaviors in all participants. Findings suggest the implementation of Social Stories is feasible and can result in positive outcomes. Additional research is needed to further investigate the application of Social Stories intervention within the context of a group setting and to consider how language levels effect outcomes.

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APPENDIX A

Social Stories

Taking Turns Under the Parachute

When I am at camp, sometimes I will play parachute.
Other children will play too. This is okay.
The teacher will say “parachute up”.
All the children will lift the parachute up.
The teacher will call a name.
A child will run under.
I can go under when the teacher says my name.
We will count to ten and the teacher will tell me to come out.
I will try to come out and hold the handle.
I will try to wait for the other child to take their turn. This is a good idea.
The teacher will be happy when I take turns under the parachute.

Comprehension Questions

Literal

1. What game will I play at camp?
2. Who will go under the parachute?
3. Who will tell me it’s my turn?

Inferential

1. What will the teacher say when it’s time to put the parachute down?
2. How will the other child feel if I wait for him to take a turn?
3. What do I have to do when other children are playing?

Taking Turns On the Slide

When I am at camp, sometimes I will play on the slide.
Other children will play too. This is okay.
We will go on the playground.
All the children will line up.
The teacher may say “Ready, set, go”.
One child will slide down.
I can slide down when the teacher says my name.

The teacher will tell me to get in line.
I will try to get back in line.
I will try to wait for the other child to take their turn. This is a good idea.
The teacher will be happy when I take turns on the slide.

Comprehension Questions

Literal

1. What will we do on the playground?
2. Who will tell me to get in line?
3. Who will line up?

Inferential

1. How will the teacher feel if I don't wait in line?
2. Where is the slide?
3. What should I do when another child is sliding?

APPENDIX B

Social Story Components Included in Scoring Scheme for Story Information Score

Criterion	**Parachute Activity**	**Slide Activity**
Activity:	Parachute	Slide
Setting:	Camp	Camp
Initiation of activity:	Parachute goes up	Line up behind Slide
Description #1:	Other children will play too	Other children will play too
Affirmative statement:	It's ok that other children play	It's ok that other children play
Directive #1 (2 components):	Supposed to go under parachute when the teacher calls name	Supposed to slide when the teacher calls name
Description #2 (2 components):	Come out after the count of 10	Go out on playground (1) Will hear "Ready, Set, Go!" (1)
Directive #2:	Hold parachute handle	Get back in line
Directive #3:	Take turns or wait for others	Take turns or wait for others
Outcome:	The teacher will be happy	The teacher will be happy

APPENDIX C

Language Measures Raw Data

Story Information Score

	Participant 1		**Participant 2**	
Session	Components recalled (out of 12)	Averaged Story Structure Score by period	Components recalled (out of 12)	Averaged Story Structure Score by period
Baseline 1	2	1.5	1	1.5
Baseline 2	1		2	
Treatment 1	6	5.0	4	3.8
Treatment 2	3		4	
Treatment 3	6		5	
Treatment 4	5		2	
Treatment 5	N/A		4	
Treatment 6	6	5.8	5	5.5
Treatment 7	N/A		6	
Treatment 8	4		N/A	
Treatment 9	7		N/A	
Treatment 10	6		N/A	

Story Information Score

	Participant 3		**Participant 4**	
Session	Components recalled (out of 12)	Averaged Story Structure Score by period	Components recalled (out of 12)	Averaged Story Structure Score by period
Baseline 1	2	2.0	1	1.0
Baseline 2	2		1	
Treatment 1	9	11.0	1	1.25
Treatment 2	11		1	
Treatment 3	12		2	
Treatment 4	12		1	
Treatment 5	11		N/A	
Treatment 6	12	12.0	1	0.8
Treatment 7	N/A		1	
Treatment 8	12		0	
Treatment 9	12		1	
Treatment 10	12		1	

Comprehension Score

	Participant 1		**Participant 2**	
Session	Comprehension Score (out of 12)	Averaged Comprehension Score by period	Comprehension Score (out of 12)	Averaged Comprehension Score by period
Treatment 1	3	3.8	3	4.0
Treatment 2	3		4	
Treatment 3	3		6	
Treatment 4	6		4	
Treatment 5	N/A		3	
Treatment 6	6	6.0	5	4.5
Treatment 7	N/A		4	
Treatment 8	6		N/A	
Treatment 9	6		N/A	
Treatment 10	6		N/A	

	Participant 3		**Participant 4**	
Session	Comprehension Score (out of 12)	Averaged Comprehension Score by period	Comprehension Score (out of 12)	Averaged Comprehension Score by period
Treatment 1	10	8.6	2	1.0
Treatment 2	5		1	
Treatment 3	9		1	
Treatment 4	9		0	
Treatment 5	10		N/A	
Treatment 6	10	10.5	N/A	1.0
Treatment 7	N/A		2	
Treatment 8	11		0	
Treatment 9	11		2	
Treatment 10	10		0	

Mean Length of Utterance in Morphemes

	Participant 1		**Participant 2**	
Session	MLUm	Averaged MLUm by period	MLUm	Averaged MLUm by period
Baseline 1	3.92	4.8	1.71	1.6
Baseline 2	5.64		1.5	
Treatment 1	7	6.4	4.5	4.6
Treatment 2	5.26		5.08	
Treatment 3	6.46		5	
Treatment 4	6.71		3.91	
Treatment 5	N/A		4.42	
Treatment 6	7	6.5	4.31	4.9
Treatment 7	N/A		5.5	
Treatment 8	5.88		N/A	
Treatment 9	7.14		N/A	
Treatment 10	5.93		N/A	

Mean Length of Utterance in Morphemes

	Participant 3		**Participant 4**	
Session	MLUm	Averaged MLUm by period	MLUm	Averaged MLUm by period
Baseline 1	6.75	7.3	1.79	1.5
Baseline 2	7.83		1.25	
Treatment 1	7.62	8.2	1	1.1
Treatment 2	8.92		1	
Treatment 3	7.92		1	
Treatment 4	8.14		1.5	
Treatment 5	8.46		1	
Treatment 6	8.42	8.1	1.07	1.4
Treatment 7	N/A		2.36	
Treatment 8	8.14		1.33	
Treatment 9	8.33		1.29	
Treatment 10	7.53		1	

Number of Different Words

	Participant 1		**Participant 2**	
Session	NDW	Averaged NDW by period	NDW	Averaged NDW by period
Baseline 1	33	31	13	12
Baseline 2	29		10	
Treatment 1	44	39	28	23
Treatment 2	33		27	
Treatment 3	36		22	
Treatment 4	42		15	
Treatment 5	N/A		22	
Treatment 6	47	42	27	27
Treatment 7	N/A		26	
Treatment 8	41		N/A	
Treatment 9	43		N/A	
Treatment 10	38		N/A	

Number of Different Words

	Participant 3		**Participant 4**	
Session	NDW	Averaged NDW by period	NDW	Averaged NDW by period
Baseline 1	35	41	13	9
Baseline 2	47		5	
Treatment 1	41	45	1	5
Treatment 2	49		9	
Treatment 3	44		3	
Treatment 4	46		11	
Treatment 5	44		1	
Treatment 6	47	46	7	7
Treatment 7	N/A		10	
Treatment 8	44		4	
Treatment 9	48		7	
Treatment 10	44		5	

Appendix D

Behavioral Measures Raw Data

Dropped Handle Measure

	Participant 1		**Participant 2**	
Session	# times parachute handle was dropped	Averaged # times dropped handle by period	# times parachute handle was dropped	Averaged # times dropped handle by period
Baseline 1	0	0	0	0
Treatment 1	0	1.5	0	0
Treatment 2	3		0	
Treatment 3	N/A		0	
Treatment 4	0	0	N/A	N/A
Treatment 5	0		N/A	

	Participant 3		**Participant 4**	
Session	# times parachute handle was dropped	Averaged # times dropped handle by period	# times parachute handle was dropped	Averaged # times dropped handle by period
Baseline 1	1	1	11	11
Treatment 1	0	0	4	5.67
Treatment 2	0		4	
Treatment 3	0		9	
Treatment 4	0	.5	5	4
Treatment 5	1		3	

Returned to Handle Measure

	Participant 1		**Participant 2**	
Session	# times returned to parachute handle	Averaged # times returned to handle by period	# times returned to parachute handle	Averaged # times returned to handle by period
Baseline 1	0.5	0.5	1.5	1.5
Treatment 1	0.33	.92	0.5	1.11
Treatment 2	1.5		1.33	
Treatment 3	N/A		1.5	
Treatment 4	1.5	1.75	N/A	N/A
Treatment 5	2		N/A	

	Participant 3		**Participant 4**	
Session	# times returned to parachute handle	Averaged # times returned to handle by period	# times returned to parachute handle	Averaged # times returned to handle by period
Baseline 1	1.33	1.33	1	1
Treatment 1	1.33	1.78	N/A	.75
Treatment 2	0		1	
Treatment 3	1		0.5	
Treatment 4	1	1	N/A	1
Treatment 5	1		1	

Interruptions to another child's turn

	Participant 1		**Participant 2**	
Session	Interruptions	Averaged Interruptions by period	Interruptions	Averaged Interruptions by period
Baseline 1	0	0.5	0	0
Baseline 2	1		0	
Treatment 1	1	0.25	0	1.6
Treatment 2	0		5	
Treatment 3	0		0	
Treatment 4	0		1	
Treatment 5	N/A		2	
Treatment 6	0	0.25	1	1
Treatment 7	N/A		1	
Treatment 8	0		N/A	
Treatment 9	1		N/A	
Treatment 10	0		N/A	

Interruptions to another child's turn

	Participant 3		**Participant 4**	
Session	Interruptions	Averaged Interruptions by period	Interruptions	Averaged Interruptions by period
Baseline 1	0	0	2	1
Baseline 2	0		0	
Treatment 1	0	0.4	0	0.6
Treatment 2	1		0	
Treatment 3	0		0	
Treatment 4	1		0	
Treatment 5	0		3	
Treatment 6	0	0.75	0	0
Treatment 7	N/A		0	
Treatment 8	0		0	
Treatment 9	0		0	
Treatment 10	3		0	

Prompted Turns

	Participant 1		**Participant 2**	
Session	% of prompted turns	Averaged % of prompted turns by period	% of prompted turns	Averaged % of prompted turns by period
Baseline 1	100	100	100	50
Baseline 2	100		0	
Treatment 1	0	63	50	80
Treatment 2	100		100	
Treatment 3	50		50	
Treatment 4	100		100	
Treatment 5	N/A		100	
Treatment 6	100	88	N/A	100
Treatment 7	N/A		100	
Treatment 8	100		N/A	
Treatment 9	50		N/A	
Treatment 10	100		N/A	

Prompted Turns

	Participant 3		**Participant 4**	
Session	% of prompted turns	Averaged % of prompted turns by period	% of prompted turns	Averaged % of prompted turns by period
Baseline 1	100	100	67	34
Baseline 2	N/A		0	
Treatment 1	33	75	50	65
Treatment 2	75		75	
Treatment 3	67		0	
Treatment 4	100		100	
Treatment 5	100		100	
Treatment 6	50	81	0	40
Treatment 7	N/A		0	
Treatment 8	100		0	
Treatment 9	75		100	
Treatment 10	100		100	

APPENDIX E

Institutional Review Board Approval Form

University and Medical Center Institutional Review Board
East Carolina University
Ed Warren Life Sciences Building • 600 Moye Boulevard • LSB 104 • Greenville, NC 27834
Office **252-744-2914** • Fax **252-744-2284** • **www.ecu.edu/irb**
Chair and Director of Biomedical IRB: L. Wiley Nifong, MD
Chair and Director of Behavioral and Social Science IRB: Susan L. McCammon, PhD

TO: John Heilmann, PhD, Dept of Communication Sciences & Disorders, 3310 LAHN Building, ECU

FROM: UMCIRB

DATE: June 20, 2008

RE: Expedited Category Research Study

TITLE: "The Effects of Social Stories™ on Language and Social Appropriateness in Children with Autism Spectrum Disorders"

UMCIRB # 08-0406

This research study has undergone review and approval using expedited review on 6.20.08. This research study is eligible for review under an expedited category because it is a on collection of data from voice, video, digital, or image recordings made for research purposes. It is also a research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies. (NOTE: Some research in this category may be exempt from the HHS regulations for the protection of human subjects. 45 CFR 46.101(b)(2) and (b)(3). This listing refers only to research that is not exempt.)
Dr. S. McCammon deemed this **unfunded** study **no more than minimal risk** requiring a continuing review in **12 months**. Changes to this approved research may not be initiated without UMCIRB review except when necessary to eliminate an apparent immediate hazard to the participant. All unanticipated problems involving risks to participants and others must be promptly reported to the UMCIRB. The investigator must submit a continuing review/closure application to the UMCIRB prior to the date of study expiration. The investigator must adhere to all reporting requirements for this study.

The above referenced research study has been given approval for the period of **6.20.08** to **6.19.09**. The approval includes the following items:

- Internal Processing Form
- Parent Questionnaire
- TACL-3: Profile/Examiner Record Booklet
- Informed Consent
- Taking Turns Under Parachute

Dr. S. McCammon does not have a potential for conflict of interest on this study.

The UMCIRB applies 45 CFR 46, Subparts A-D, to all research reviewed by the UMCIRB regardless of the funding source. 21 CFR 50 and 21 CFR 56 are applied to all research studies under the Food and Drug Administration regulation. The UMCIRB follows applicable International Conference on Harmonisation Good Clinical Practice guidelines.

APPENDIX F

Informed Consent Documents

CONSENT DOCUMENT

Title of Research Study: The effects of Social Stories™ on language and social appropriateness in children with autism spectrum disorders

Principal Investigator: John Heilmann, PhD, CCC-SLP
Research Assistant: Kelly Taylor, BS
Institution: East Carolina University
Address: School of Allied Health Sciences, Department of Communication Sciences and Disorders, Health Sciences Building, Greenville, NC 27858-4353
Telephone #: (252) 744-6146

INTRODUCTION

You have been asked to participate in a thesis research study being conducted by Kelly Taylor, Graduate Student Clinician, under the direction of John Heilmann, PhD, CCC-SLP. The goal of this study is to document increases in language and social skills through the use of Social Stories™ (Gray, 1991) to provide accurate social information to children with autism spectrum disorders in a meaningful way.

PLAN AND PROCEDURES

The study will be conducted during the Pirate S.P.E.E.C. H. Camp this summer. Your child will first complete a hearing screening and one preliminary test individually with the clinician. This will be completed at your convenience the week before the start of camp. At that time, you will be asked to fill out a short parent questionnaire about the language and social skills of your child. During camp, the clinician will individually read a Social Story™ to your child at the beginning of the day and ask him to retell the story followed by answering some basic comprehension questions. During the day, observation of your child's participation in camp activities will be videotaped and later reviewed to measure language and social interactions.

POTENTIAL RISKS AND DISCOMFORTS

There are no more than minimal risks associated with completing this study. Your child will fully participate in all camp activities with the other children during the course of the study.

POTENTIAL BENEFITS

This research will let us identify a possible way to improve language, decrease negative behaviors, and increase positive behaviors in children with autism spectrum disorders. The Social Stories™ used are written specifically for camp activities and may help your child have a better understanding for what to expect during camp activities while improving social skills. Because this is a short study, you will not likely see a large

Participant's initials

change in your child's overall oral language and/or social skills outside of the camp environment.

SUBJECT PRIVACY AND CONFIDENTIALITY OF RECORDS

All of the information collected during the study will be kept confidential. These scores will not be released to any other agency unless the participant completes and signs necessary forms according to HIPPA standards. The amount of time that documentation will be stored is unknown; however, when documentation is taken out of storage, it will be destroyed using a shredding machine and all video recordings will be erased.

COSTS OF PARTICIPATION

There are no additional costs associated with participation in this study aside from the regular camp fee.

COMPENSATION

Research participants will not be compensated for participation in this study.

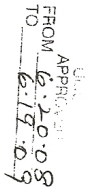
VOLUNTARY PARTICIPATION

Participating in this study is voluntary. If you decide not to be in this study after it has already started, you may stop at any time without losing benefits that you should normally receive. You may stop at any time you choose without penalty.

PERSONS TO CONTACT WITH QUESTIONS

The investigators will be available to answer any questions concerning this research, now or in the future. For any questions or concerns, you may contact Kelly Taylor at (804)837-2544 or Dr. John Heilmann at (252)744-6146. If you have questions about your rights as a research subject, you may call the Chair of the University and Medical Center Institutional Review Board at phone number 252-744-2914 (days) and/or the ECU Risk Management Office at 252-328-6858.

Participant's initials



CONSENT TO PARTICIPATE

Title of research study: The effects of Social Stories™ on language and social appropriateness in children with autism spectrum disorders

I have read all of the above information, asked questions and have received satisfactory answers in areas I did not understand. (A copy of this signed and dated consent form will be given to the person signing this form as the participant or as the participant authorized representative.)

Participant's Name **(PRINT)**	**Signature**	**Date**	**Time**

If applicable:

Guardian's Name **(PRINT)**	**Signature**	**Date**	**Time**

PERSON ADMINISTERING CONSENT: I have conducted the consent process and orally reviewed the contents of the consent document. I believe the participant understands the research.

Person Obtaining consent **(PRINT)**	**Signature**	**Date**
Kelly Taylor, Graduate Student Clinician Principal Investigator's **(PRINT)**	**Signature**	**Date**
John J. Heilmann, PhD, CCC-SLP Director **(PRINT)**	**Signature**	**Date**

Participant's initials

UMCIRB HIPAA Authorization Checklist/Approval Form

UMCIRB #: 08-0406 **PI:** John Heilmann

Title of study (full or abbreviated): The Effects of Social Stories™ on Language and Social Appropriateness in Children with Autism Spectrum Disorders

Check one of the boxes below:

- [x] Use of ECU "Research Participant Authorization to Use and Disclose Information for Research"
- [ ] Use of a sponsor/granting agency or other alternative HIPAA Patient Authorization
- [ ] Use of research informed consent document form with required elements of the HIPAA Patient Authorization

Designated UMCIRB reviewer has reviewed the substitute HIPAA Patient Authorization for Research or proposed research consent form and found that it is written in plain language and contains:

Yes	No	
[x]	[ ]	A specific and meaningful description of the information to be used or disclosed
[x]	[ ]	The name or identification of persons or class of persons authorized to make requested use/disclosure of PHI
[x]	[ ]	The name or identification of persons or class or persons who will use PHI for research-related purposes
[x]	[ ]	A description of each purpose of the use or disclosure
[x]	[ ]	The individual's signature (or that of his/her authorized representative) and the date.
[x]	[ ]	An expiration date or event, or a statement "end of research study" or "none" when appropriate
[x]	[ ]	A statement that the individual may revoke the authorization in writing;
[x]	[ ]	Any exceptions to the right to revoke (e.g. researcher may continue to use and disclose, for research integrity and reporting purposes any PHI collected from the individual pursuant to such Authorization before it was revoked).
[x]	[ ]	A statement that information disclosed under the Authorization could potentially be re-disclosed by the recipient and would no longer be protected under HIPAA.
[x]	[ ]	A statement of the ability or inability to condition treatment, payment, enrollment or eligibility for benefits on the authorization by stating either stating the applicable conditions or the consequences to the individual for refusal to sign the authorization.

- [x] **All the above elements are present, HIPAA AUTHORIZATION document is APPROVED**
- [ ] **All the above elements are <u>not</u> present; HIPPA AUTHORIZATION document is NOT APPROVED**

Susan McCammon — 6-20-08

Designated UMCIRB Reviewer — **Date**

Principal Investigator: Present this signed form at the time PHI is requested from custodians of records. ***By signing this document, I acknowledge and affirm that all enrolled subjects have signed a valid HIPAA Authorization Form.***

Principal Investigator — **Date**

UMCIRB APPROVED FROM 6.20.08 TO no expiration

UMCIRB APPROVED FROM [illegible] TO [illegible]

Version 08-04-03

UMCIRB HIPAA Privacy Authorization

The Brody School of Medicine (BSOM)/Pitt County Memorial Hospital (PCMH): Research Participant Authorization to Use and Disclose Protected Health Information for Research

For use only with the research consent form for: UMCIRB#: 08-0406
PI: John Heilmann
Title: Assistant Professor

When taking part in research, protected health information (PHI) is collected, used, and shared with others who are involved in the research. Federal laws require that researchers and health care providers protect your PHI. Also, federal laws require that we get your permission to use collected PHI for the research. This permission is called authorization.

In order to complete the research project in which you have decided to take part, we need to collect and use some of your PHI as described below.

What types of protected health information (PHI) about me will be used or disclosed?

[☐] BSOM/PCMH Billing records

[☐] PCMH medical records (in and out patient)

[☐] BSOM/PCMH Mental Health records

[☐] PCMH/BSOM lab, pathology and/or radiology results

[☐] BSOM Physician/clinic records

[☐] PHI previously collected for research purposes

[☒] Other: ECU Speech Language and Hearing Clinic Records

Who will use or disclose my PHI?

[☒] Principal Investigator

[☒Other members of the research team

[☐]Other providers involved in your care during research procedures, outpatient/inpatient stays during which research is being performed, or physician office visits during which research is being performed.

Location where research will be conducted

The members of the research team will conduct the research study at:
☒ East Carolina University (ECU) ☐ PCMH ☐ ECU & PCMH ☒ Other ECU Speech Language and Hearing summer language camp

APPROVED
FROM 6-20-08
TO 6-20-09

Who will receive my PHI?

[☐] Sponsor or other funding source to provide oversight for entire research project
[☒] Research investigators to conduct and oversee the research project
[☐] Research team members to participate in the various research activities
[☐] FDA or other regulatory agencies to provide regulatory oversight
[☐] UMCIRB to provide continuing review of the research project
[☐] Institutional officials in connection with duties for monitoring research activity
[☐] Researchers at other sites to participate in the research when more than one research site is involved
[☐] Other

We will share only the PHI listed above with the individuals/agencies listed above. If we need to share other PHI or if we need to send PHI to other individuals/agencies not listed above, we will ask for your permission in writing again

How my PHI may be released to others:

The BSOM and PCMH are required under law to protect your PHI. However, those individuals or agencies who receive your PHI may not be required by the Federal privacy laws to protect it and may share your PHI with others without your permission, if permitted by the laws governing them.

What if I do not sign this form?

You will not be eligible to participate in this study if you do not sign this Authorization form.

How may I revoke (take back or withdraw) my authorization?

You have the right to stop sharing your PHI. To revoke (or take back) your authorization, you must give the investigator your request to revoke (or take back) your authorization in writing. If you want us to stop collecting your PHI for the study, you may be removed from the study. If you are removed from the study it will not affect your ability to receive standard medical care or any other benefits for which you are entitled to receive. PHI collected for the research study prior to revoking (or taking back) your Authorization will continue to be used for the purposes of the research study. Also, the FDA (if involved with your study) can look at your PHI related to the study even if you withdraw this authorization.

Restrictions on access to my PHI:

You may not be able to see your PHI in your medical record related to this study until the study is complete. If it is necessary for your care, your PHI will be provided to you or your physician.

UMCIRB APPROVED FROM 6/20/08 TO 2/8/09

How long may the PHI about me be used or disclosed for this study?
Research information continues to be looked at after the study is finished so it is difficult to say when use of your PHI will stop. There is not an expiration date for this authorization to use and disclose your PHI for this study.

If you have questions about the sharing of PHI related to this research study, call the principal investigator Kelly Taylor at phone number 804-837-2544 or Dr. John Heilmann, director at 252-744-6146 . Also, you may telephone the University and Medical Center Institutional Review Board at 252-744-2914. In addition, if you have concerns about confidentiality and privacy rights, you may phone the Privacy Officer at Pitt County Memorial Hospital at 252-847-6545 or the Privacy Officer at East Carolina University at 252-744-5200.

Authorization

To authorize the use and disclosure of your PHI for this study in the way that has been described in this form, please sign below and date when you signed this form. A signed copy of this Authorization will be given to you for your records.

Participant's Name (print)	**Signature**	**Date**

Authorized Representative Name (print)-----Relationship	**Signature**	**Date**

Person Obtaining Authorization	**Signature**	**Date**